What is claimed is:

1. A layered proton exchange membrane, comprising:

an organic/inorganic composite membrane, comprising inorganic proton conductor and organic base polymer; and

at least one proton exchange membrane.

2. The layered proton exchange membrane as claimed in claim 1, wherein the inorganic proton conductor is H_3O^+ β -alumina, $Sb_2O_5*5.4H_2O$, H-modenite, heteropoly acid, zeolite, zirconium phosphate, silicon oxide, titanium oxide, tungsten acid, sulfated zirconia, sulfated alumina, sulfated titanium oxide or sulfated titanium-aluminum oxide.

3. The layered proton exchange membrane as claimed in claim 1, wherein the organic base polymer is a proton conductive polymer.

4. The layered proton exchange membrane as claimed in claim 1, wherein the organic base polymer and base material of the proton exchange membrane are polymers with cationic ion exchange groups.

5. The layered proton exchange membrane as claimed in claim 4, wherein the polymers with cationic ion exchange groups are poly(vinylidenefluoride)-grafted-sulfonatedpolystyrene (PVDF-g-SPS), PVDF-g-sulfonated-poly(N-vinylcarbazole), PVDF-g-poly(vinylphosphonic acid), PVDF-g-poly(4-vinylbenoic acid), PVDF-g-

Sulfonated-poly(2-vinylnaphthalene), or PVDF-g-Sulfonated-poly(9-vinylanthracene).

6. The layered proton exchange membrane as claimed in claim 5, wherein the cationic ion exchange resins are sulfonate, carboxylate, phosphonate, imide, sulfonimide or sulfonamide.

7. The layered proton exchange membrane as claimed in claim 1, wherein the organic base polymer further comprises fluorine-containing resin to form the organic/inorganic composite membrane.

8. The layered proton exchange membrane as claimed in claim 7, wherein the fluorine-containing resin is poly(vinylidenefluoride), poly(vinylidenefluoride/hexafluoropropylene) copolymer, poly(vinylidenefluoride/chlorotrifluoroethylene)copolymer, poly(vinyilidenefluoride/hexafluoropropylene/tetrafluoroethylene) tripolymer or poly(chlorotrifluoro ethylene).

9. The layered proton exchange membrane as claimed in claim 1, wherein the organic base polymer further comprises non fluorine-containing resin to form the organic/inorganic composite membrane.

10. The layered proton exchange membrane as claimed in claim 9, wherein the non fluorine-containing resin is polyacrylate, polyester, polyetherketone, polysulfone, polyether, polyamide, polyphenylene oxide or polyethylene oxide.

11. The layered proton exchange membrane as claimed in claim 1, wherein the methanol permeability of the organic/inorganic composite membrane is less than $10^{-7}cm^2/s$.

12. The layered proton exchange membrane as claimed in claim 1, wherein the proton conductivity of the organic/organic composite membrane is at least $10^{-4}S/cm$.

13. A method for preparing a layered proton exchange membrane, comprising of:

(a) forming an organic/inorganic composite membrane by doping inorganic proton conductor in organic base polymer; and

(b) combining the organic/inorganic complex membrane and a proton exchange membrane to form a layered proton exchange membrane.

14. The method as claimed in claim 13, wherein the step (a) is performed by physical blending, chemical cross-linking, UV radiation cross-linking or sol-gel.

15. The method as claimed in claim 13, wherein the step (b) is performed by thermal pressing, chemical cross-linking or UV radiation cross-linking.

16. The method as claimed in claim 13, wherein the number of the proton exchange membrane is at least one and the organic/inorganic composite membrane is located on one side of the layered proton exchange membrane.

17. The method as claimed in claim 13, wherein step (b) further comprises combining an adhesive film between the organic/inorganic composite membrane and the proton exchange membrane.

18. The method as claimed in claim 13, further comprising introducing cationic ion exchange groups into the layered proton exchange membrane.

19. A direct liquid-feed methanol fuel cell, comprising:

a cathode;

an anode; and

a layered proton exchange membrane, formed by lamination of an organic/inorganic composite membrane with at east one proton exchange membrane, wherein the organic/inorganic composite membrane comprises organic base polymer and inorganic proton conductor.

20. The direct methanol fuel cell as claimed in claim 19, wherein the methanol permeability of the organic/inorganic composite membrane is less than $10^{-7}cm^2/s$.

21. The direct methanol fuel cell as claimed in claim 19, wherein the proton conductivity of the organic/inorganic composite membrane is at least $10^{-4}S/cm$.